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FOR MODEL  
OPAL-300/400  
RUBY-300/400

## OPAL & RUBY 300/400 PARTS

Your PULSPORTS consists of four parts:

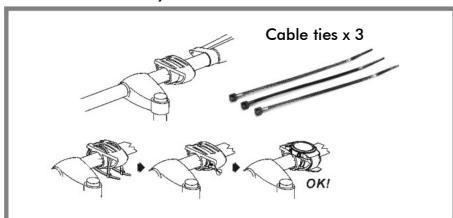
1. Elastic strap



2. Transmitter



3. Bracket For Bicycle



4. OPAL- 300/400



RUBY- 300/400



## INSTALLATION

How to wear the chest belt?

Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6

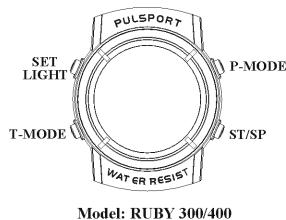
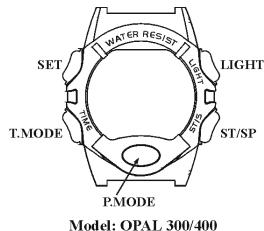


Fig. 7



1. Fasten the fastener at one end, put the chest belt on your chest and loosen the stretch band. (Fig. 1, 2 and 3)
2. Adjust the length of the stretch band until you feel conformable, but the stretch band must cling to the chest; then fasten the fastener at the other end. (Fig. 4)
3. Adjust the sensor to the center of your chest and be sure the backside of the sensor is clings to your chest and touches the skin. (Fig. 5, 6)
4. The chest belt has to be worn while using the heart rate function. The distance transmission should be less than 1 meter (3 feet).
5. Do not bend or fold the chest belt to preventing damage. (Fig. 7)

## KEY OPERATION



### Basic key operations:

- SET** – Hold for 2 seconds to enter data setting mode
- T.MODE** – Change watch function group
- P.MODE** – Change pulse function group
- ST/SP** – Start / Stop
- LIGHT** – EL Light (press during 3 second interval)

### Data setting key operations:

- SET** – Press to quit data setting
- T.MODE** – Press to add one unit to the value
- Hold to increase the value automatically.
- P.MODE** – Press to change the value
- ST/SP** – Press to decrease the value
- Hold to decrease the value automatically.

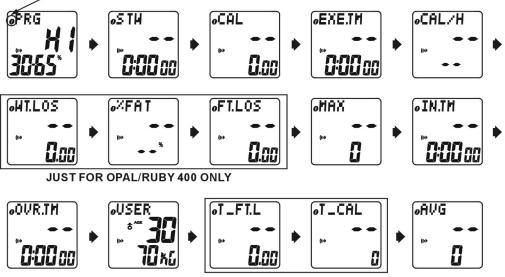
## Fig. A) TIME MODE CIRCULATION

Only OPAL/RUBY 400 have this signal

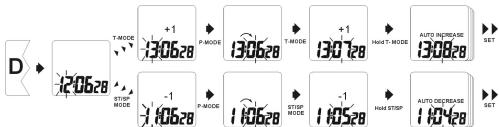


## Fig. B) PULSE MODE CIRCULATION

Only OPAL/RUBY 400 have this signal



## Fig. C) DATA SETTING PROCESSES



1. Press P.MODE to change setting digit.
2. Press T.MODE to add to the value, hold to add to the value automatically.
3. Press ST/SP to decrease the value, hold to decrease the value automatically.
4. Press SET to complete setting and quit.

# PULSPORTS FUNCTIONS

※Please refer to the model number purchased; some functions may not be available.

## ♥ Watch functions

1. **CLOCK:** 12/24-hour, date, day of week display.
2. **DATE:** Year, Month, Date, Day of week, 2000-2099.
3. **COUNTDOWN TIMER:** Countdown timer from 99:59:59- 00:00:00.
4. **ALARM:** Beep alarm, 5 settings available.
5. **CHRONOMETER:** Stopwatch from 00:00:00-99:59:59.
6. **CHIME & Key beep:** Chime and key beep option
7. EL backlight.
8. Water resistant (3 ATM).
9. Low battery power indicator.

## ♥ Heart Rate Functions

1. Display the current heart rate (HR).
2. **DIGITAL INTENSITY:** Calculate your Heart beat intensity (current HR + Max. HR × 100%) automatically according to your personal data input.
3. **PROGRAM:** Target Zone, 3 modes to setup; each mode has 9 steps (9 target zones).
4. **STOPWATCH:** 00:00:00 to 99:59:59 when the heart rate is detected.
5. **CAL:** Calculate expended calories during exercise (0 to 9999.99 Kcal) according to your personal data input.
6. **EX.E.TIME:** Calculate exercise time while the heart rate is at the lower limit of a preset target zone.
7. **CAL / H:** Calories expenditure per hour at current intensity of heart rate (0 to 3333Kcal).
8. **WT.LOS:** Calculate weight lost from exercise (0 to 9999.99g) according to your personal data input.
9. **% FAT Loss:** Calculate the percent of fat lost clearly *from the all expended calories; thus you will see that the fat loss varies and depends on the intensity of heart rate.*

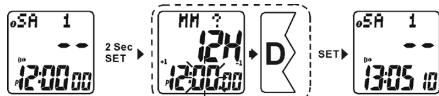
10. **FT.LOS:** Calculate fat lost from exercise (0 to 9999.99g) according to your personal data input.
11. **MAX:** Maximum HR during exercise (40 to 240 bpm).
12. **IN.TM:** Exercise time within target zone (00:00:00 to 99:59:59).
13. **OVR.TM:** Time over upper limit of target zone during exercise (00:00:00 to 99:59:59).
14. **USER:** User data setup, age (5 to 99), weight (10 to 199 kg or 10 to 499lbs.) and sex.
15. **T\_FTL:** Total fat lost from exercise, weekly or monthly option (0 to 9999.99g).
16. **T\_CAL:** Total Kcal expenditure, weekly or monthly calories consumption can be calculated (0 to 999999 Kcal).
17. **Avg:** Average HR during exercise (0 to 300 bpm).

- Program starts to calculate the calorie expenditure and relating data only while the HR is over 90bpm.
- bpm (beeps per minute) 40 to 240.

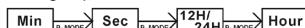
# WATCH FUNCTION DESCRIPTION

## ♥ Clock mode

1. 12H or 24H switchable.
2. Turn Chime function On/Off by press ST/SP 2 seconds in this mode.
3. **Clock setting:**
  - a). Press T.MODE to select "CLK" mode.
  - b). Press SET 2 seconds to start clock setting mode.
  - c). Press P.MODE to change the digit to be set.
  - d). Press T.MODE to add to the value, hold to add to the value automatically.
  - e). Press ST/SP to decrease the value, hold to decrease the value automatically.
  - f). Press T.MODE or ST/SP to select 12H or 24H mode.
  - g). Press T.MODE or ST/SP to reset the seconds to "00".
  - h). Press SET to complete setting and quit.



Setting sequence:

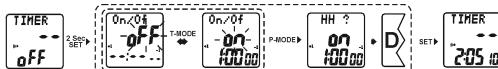


## Heart Countdown timer mode

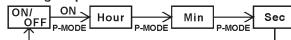
1. Press ST/SP to start/stop countdown timer.
2. Symbol as “⌚” will display when start counting down
3. There will be a 10 seconds beep when the function is completed, “⌚” will flash, and OVER will display on the LCD.
4. Stop beep and reload pre-set data by pressing any key.
5. Reload pre-set date at any time by pressing T.MODE 2 seconds.
6. Maximum range for countdown is 99H59M59S.

### Countdown timer setting:

- a) Press T.MODE to select “TIMER” mode.
- b) Press SET for 2 seconds to enter timer.
- c) Press T.MODE or ST/SP to set timer On or Off.
- d) Refer the [Data Setting Processes](#) to adjust the Timer data.

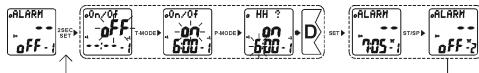


Setting Sequence:



## Heart Alarm mode

1. Press ST/SP to change alarm settings (1 to 5).
2. The “⌚” symbol will display after alarm setup.
3. The alarm is a 30 seconds beep, the “⌚” symbol will blink.
4. Stop the beep by pressing any key.
5. Take note of the time mode you have selected 12H or 24H.
6. **Alarm setting:**
  - a) Press T.MODE to select “ALARM” mode.
  - b) Press SET for 2 seconds to enter alarm setting mode.
  - c) Press T.MODE or ST/SP to set timer On or Off.
  - d) Refer the [Data Setting Processes](#) to adjust the Alarm data.
  - e) Press ST/SP to enter next alarm setting.
  - f) Repeat steps b-d to set the other alarm.

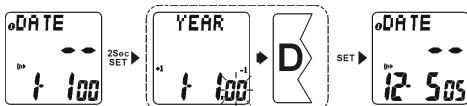


Setting Sequence:



## Heart Date mode

1. Calendar from the year 2000 to 2099.
2. Day of week will display automatically while the date is input.
3. **Date setting:**
  - a) Press T.MODE to select “DATE” mode.
  - b) Press SET for 2 seconds to enter data setting mode.
  - c) Refer the [Data Setting Processes](#) to adjust the Date data.



Setting Sequence:



## Heart Chronometer mode

1. Press ST/SP to start/stop chronometer.
2. Press T.MODE for 2 seconds to reset chronometer data.
3. Maximum range is 99H59M59S.

# HEART RATE FUNCTION DESCRIPTIONS

## 1. Start /Stop heart rate measure function

1. Press P.MODE for 2 seconds to start heart rate measurement function.
2. When the function is operating, the LCD will display the signal as "" and "**bpm**".
3. Press P.MODE for 2 seconds to stop heart rate measurement function.
4. If a signal is not received for 5 minutes, the function will turn off automatically.

## 2. Start/Stop heart rate data record function

1. Press ST/SP to start heart rate measurement function.
2. Press P.MODE to switch to EXE-TM function.
3. Press ST/SP, the signal shown as "**STOP**" at the top right of the display will change to "", and this means the data record function is started. Stop by pressing ST/SP, the signal will change to "**STOP**".
4. AVG, STW, CAL, EXE.TM, WT.LOS, FT.LOS, MAX, IN.TM, OVR.TM, T-FT.L and T-CAL functions will only work while the record function is on.
5. CAL/H and %FAT Loss will be displayed automatically when heart rate is measured. The value will become "--" while no pulse is detected.
6. CAL, CAL/H, WT.LOS, %FAT Loss, FT.LOS and T-FT.L mode will be calculated when the heart rate is equal or over 90 bpm.

## 3. Reset heart rate record data

1. Press P.MODE to switch to EXE-TM mode.
2. Press T.MODE for 2 seconds to clear the record.
3. T-CAL and T-FT.L record can only be erased under the original function mode.

## 4. Heart rate display descriptions

1. Intensity = Current heart rate/Maximum heart rate.
2. Range of heart rate measurement is from 40 bpm to 240 bpm.

## 5. Program target zone mode (3 modes option)

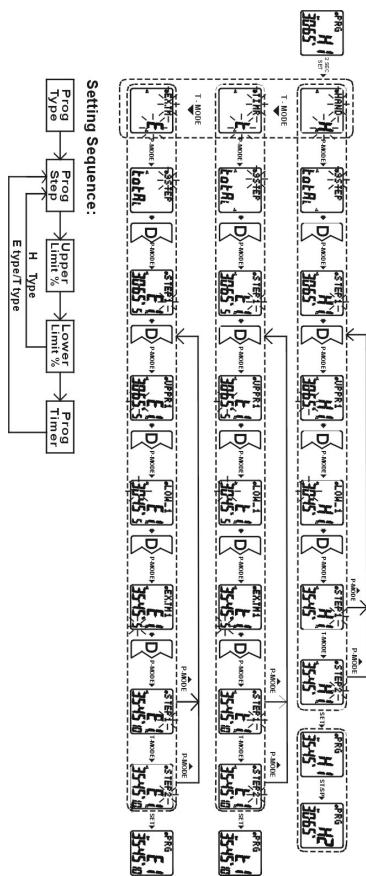
Setup the target zone by entering the percentage of maximum heart rate for the following 3 modes. Maximum heart rate based on the data you input.

1. There are 3 mode of programmable target zones setup:
    - a. H: Switch the Target Zone manually.
    - b. T: Switch the Target Zone automatically according to the setup time (0-99 minutes) for each zone; program will jump to the next zone when the timer for the current zone is complete.
    - c. E: Switch the Target Zone automatically according to the setup exercise time (0-99 minutes) for each zone; program will jump to the next zone when the exercise time for the current zone is complete.
  2. The Beep alarm will sound when the target zone shifts from one zone to another in auto-shift mode. It will beep for 10 seconds when all target zones are complete, and END will be displayed.
  3. In any zone, press T.MODE for 2 seconds for restart from the first zone.
  4. "" will display when the heart rate within the target zone.
  5. "" will display when the heart rate is below the lower limit of the target zone. (Beep should sound).
  6. "" will display while the heart rate is above the upper limit of target zone. (Beep should sound).
7. **Target zone program setting:**
- a. Press P.MODE to select "PRG" mode.
  - b. Press SET for 2 seconds to enter program target zone setting mode.
  - c. Press T.MODE or ST/SP to choose the type of program.
  - d. Refer the [Data Setting Processes](#) to adjust the Target zone data. (Refer Fig .D)

## 6. Stop watch mode

1. Calculation of exercise time only works while a heart rate is detected.
2. The range is from 0 hr. 00 min. 00sec. to 99 hr. 59 min. 59 sec.

**Fig. D) Digital intensity target zone program setting**



### 7. Calorie mode

- CAL**
1. Calculates the calories expended for the whole exercise process, not only from exercise.
  2. Males expend more calories than females at the same heart rate, likewise, the female heart rate will be higher than male heart rate doing the same amount of exercise.
  3. Calories consumption will be affected by Heart rate, sexuality, weight and type of exercise.
  4. The unit for calories is Kcal.
  5. The range is from 0 Kcal to 9999.99 Kcal.

### 8. Exercise time mode

**EXE.TM**

1. Calculation and recording the exercise time starting when the heart rate reaches the lower value set for the target zone.
2. Total efficient exercise time will be recorded, including the time in and above the target zone.
3. The exercise time records ranges from 00H00M00S to 99H59M59S.

### 9. Calories per hour mode

**CAL/H**

1. Calculates the expended calories per hour based on the current heart rate.
2. Increasing or decreasing the heart rate intensity can control target calorie consumption.
3. The range for calorie consumption per hour is from 0 to 9999 Kcal.

### 10. Weight loss mode

**WT.LOS**

1. Calculates the weight loss during exercise. (Including the consumption of carbohydrates and fat).
2. Range of weight lose from 0 to 9999.99 g.

### 11. %Fat loss mode

**%FAT**

1. Calories are expended from burning carbohydrate and fat, and this function can calculate the percentage of fat calories expended.
2. 50% of the energy comes from carbohydrate and 50% from fat when the body is at rest. But the most energy will come from burning carbohydrate when doing intense exercise, because the body needs time to use the fat as fuel. Intense exercise will not help you reduce fat.

3. Fat expenditure depends on the time and intensity of exercise, the more you exercise the more fat will be expended.
4. Long time walking or jogging will be helpful for reducing fat.
5. At the same heart rate, younger men will have a higher percent fat loss.
6. The range of fat percentage is from 0 to 70 %.

**12. Ft.los mode** FT.LOS

1. Calculates the weight of fat lost during exercise.
2. The actual weight of fat lost from exercise can be important, and it is a valuable reference of weight loss.
3. The range of fat loss is from 0 to 9999.99 g.

**13. Maximum mode** MAX

1. Monitors and records the maximum heart rate during exercise.
2. The range of maximum heart rate is from 40 to 240 bpm.

**14. In target zone time mode** IN.TM

1. Calculates and records the exercise time within the target zone.
2. The range is from 00H00M00S to 99H59M59S.

**15. Above target zone mode** OVR.TM

1. Calculates and records the exercise time NOT in the target zone.
2. The range is from 00H00M00S to 99H59M59S.

**16. User date mode** USER

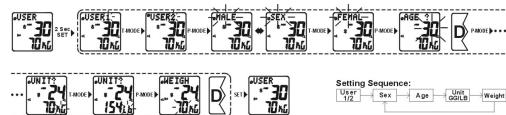
1. Enters the data for sexuality, age, weight and height of user.
2. Personal data is an important reference for calculating the consumption of calories.
3. Available for 2 independent users.
4. Range of age is from 5 to 99.
5. **Units of weight: kg from 10 to 199  
lb from 10 to 499**

**6. User data setting:**

- a). Press P.MODE to select "USER" mode.
- b). Press SET for 2 seconds to enter user date setting mode.
- c). Press P.MODE to change setting mode.

- d). Press T.MODE or ST/SP to change User 1 or 2.
- e). Press T.MODE or ST/SP to change Sexuality: male or female.
- f). Press T.MODE or ST/SP to change Weight Units: kg or lb.
- g). Refer the Data Setting Processes to adjust the User data.  
(Refer Fig E)

**Fig. E) USER DATA SETTING**



**17. Total fat loss mode** T.FTL

1. Records the total (cumulative) weight of fat lost.
2. Unless this value is reset, the data will be saved separately, so weekly or monthly cumulative weight of fat lost can be seen in this mode.
3. The range is from 0 to 9999.99 g.

**18. Total calories mode** T.CAL

1. Records the total (cumulative) calories expended.
2. Unless this value is reset, the data will be saved separately, so weekly or monthly cumulative calories consumption can be seen in this mode.
3. The range is from 0 to 9999.99 g.

**19. Average mode** AVG

1. Calculates the average heart rate during exercise: using this value we can tell if the cardiopulmonary condition has improved for the same intensity of exercise.
2. The range of average is from 40 bpm to 240 bpm.

## PRECAUTIONS

1. Take care of your chest belt. Wash the chest belt by suds, then flush out with water. Let it dry naturally, avoiding putting the chest belt under the environment of high temperature or touching the corrosive as strong acid or alkalis material.
2. Wetting the skin, where will contact the conductive area of the chest belt will improve the conduction and get more stable signal.
3. The physical condition of individual might effect the intensity of measured signal.
4. Avoiding using the heart rate monitor close to trolley car, tram stop, transformer, electric substation and high-tension distribution line etc. Because the radio signal will be affected under the environment as high voltage and strong magnetic field.
5. Although the water resist of this watch has been approved as 30 meter, but please do not operate any button of the watch under water. This watch is not designed for diving.
6. Battery can be used for 1 year according to daily use for 2 hours. Please change the battery by watch shop, and do not break the watch down by your own.

## SPECIFICATIONS

### OPAL/RUBY 300/400 Pulse Transmitter:

- Battery type: CR2032
- Battery life: Average 1300 hours.  
(You can change the battery by yourself.)
- Operating temperature: -10°C~50°C (14°F~122°F)

### OPAL/RUBY 300/400 Pulse Wrist Receiver:

- Battery type: CR2025
- Battery life: About 1 year.
- Operating temperature: -10°C~50°C (14°F~122°F)
- Water resistance: 3 ATM



*User guide and Exercise Aid for the Pulsports Heart Rate Monitor*

Thank you for choosing the Pulsports Multifunction Heart Rate Monitor. Pulsports heart rate monitor is an indispensable aid for a beginner, regular exerciser and even for the professional athlete.

The Pulsports Heart Rate Monitor features professional heart measuring and data recording functions in addition to the normal time functions of a watch. The sleek styling of the Pulsports will allow you to wear it comfortably during exercise as well as everyday use.

To ensure your safety, please use the Pulsports under a doctor or coach's direction if you have one of the following conditions:

1. Cardiopulmonary disease
2. Obesity.
3. No exercise for an extended period of time.

# READ THE FOLLOWING BEFORE USING THE PULSPORTS

## Correlation of Basic Metabolism and Heart Rate

The human body requires water, air, sunlight and food to maintain life. Water, vitamin, fibrin, carbohydrates, proteins and fat are the main elements in food. The three primary elements -- carbohydrates, protein and fat -- provide energy to body by burning oxygen. Normally, five Kcal will be used for one liter of oxygen. The burning oxygen is directly proportional with the generated of energy.

Thus, when the body requires more oxygen to burn, the frequency of breathing and heartbeat will increase to provide more oxygen.

### Basic energy requirements

$$E_{\text{total}} = \text{basic metabolism} + \text{energy consumption} \quad \text{-- Formula (1)}$$

$$VO_2 = 1 \text{ MET} + O_2 \quad \text{-- Formula (2)}$$

### 1. Basic metabolism

Energy will be expended even while we sit at rest; the consumption of oxygen is approximately 3.5 value called MET (Metabolic Equivalent). The minimum energy for maintaining the daily operation of body is called basic metabolism.

$$\text{Basic metabolism (O}_2\text{)} = 1 \text{ MET} = 3.5 \text{ ml O}_2/\text{minute/kg}$$

$$O_2 = 3.5 \text{ ml} \times 60 \times 24 / \text{kg / day} = 5.04 \text{ l/kg/day}$$

$$\text{Kcal} = 5.04 \times 5 \text{ Kcal/kg/day} = 25.2 \text{ Kcal/kg/day} (1 \text{ l O}_2 = 5 \text{ Kcal})$$

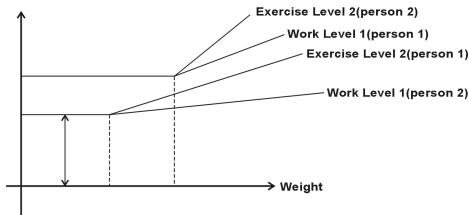
**For example,** the basic metabolism for a 70 kg is 1764 Kcal/day. ( $25.2 \times 70$ )

### 2. Energy consumption by through work or exercise

The Body needs energy to Work or to exercise. Only 22~25% (23%) of generated energy is used efficiently; i.e. in generating 1 Kcal of energy, the body expends approximately 4~5 Kcal. This means that between 75~80% of energy is transformed into heat, which is released by perspiring.

### 3. Maximum ingestion of oxygen ( $VO_2\text{-max}$ ) and maximum heart rate measurement

According to formula (1) and (2) above, the body's required energy, ingestion of oxygen, weight and work/exercise-load are proportional, as shown in the graph below:



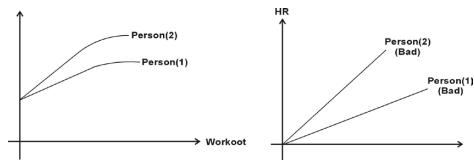
According to formula (2), an increase in work/exercise load will cause a proportional increase in output energy and  $VO_2$ . However, the output energy of the body is limited, because the lungs and heart cannot work unconfined. Hence, physical conditioning is decided by the maximum ingestion of oxygen; i.e. the individual with a higher value of maximum ingestion of oxygen is in the better physical condition.  $VO_2\text{-max}$  can be measured precisely in lab; the maximum heart rate (HRM<sub>max</sub>) can also be measured.

### 4. Estimated value of maximum heart rate

Referring to the ACSM (American Collage of Sports Medicine) formula, the maximum heart rate can be estimated as  $\text{HRM}_{\text{max}}$  (BPM, beat per minute) =  $220 - \text{Age}$ .

This formula should in fact be used merely as reference in the estimation of maximum heart rate, for in actually the rate will be affected by weight, physical conditioning and life-behavior patterns at all ages. Tolerance is approximately is at about 10~12 bpm.

## 5. Sports and the cardiovascular system



We can improve muscle strength and also cardiopulmonary condition through correct exercise. We can see improvements in the cardiopulmonary condition through the heart rate, which will decrease during exercise at the same intensity. Because of an increase in vital capacity transport, more blood and oxygen are transported by each contraction of the heart, and the skeletal muscles also receive more oxygen. This can be monitored if you use Pulsports as a guide for exercise. You can also find that recovery time will decrease as the cardiopulmonary condition is improved.

According to the statistics on cardiopathy in people with different careers in Japan, the ratio heart trouble in office staffs is 2 times that of laborers, and that of urbanites is 1.43 times that of people living in villages. Thus, we can see that exercise improves physical condition and prevents cardiopulmonary disease.

- (a). Relative intensity of exercise (%HRR): At first you have to measure the heart rate at rest ( $HR_{rest}$ ). You can record the heart rate on 5 days in succession usually in the morning after you wake up but before you get up, obtaining an average of 5 values. The resting heart rate can also be measured at a time at least 2.5 hours after meal, after sitting calmly for 3-5 minutes before measuring. According to the equation for maximum heart rate from the ACSM (American College of Sports Medicine):  $HR_{max}$  (Unit=BPM: Beats Per Minute) =  $220 - Age$ . For example, the maximum heart rate ( $HR_{max}$ ) for a 20 year old man is  $220-20=200$  BPM.

So the relative intensity of exercise (%HRR) =  $\frac{(Current\ heart\ rate - HR_{rest})}{(HR_{max} - HR_{rest})} \times 100\%$

- (b). Absolute intensity of exercise (%HR) =  $Current\ heart\ rate + HR_{max} \times 100\%$

Although recording the relative intensity of exercise (%HRR) can be an accurate monitor of the physical condition, it is inconvenient to measure the heart rate at rest ( $HR_{rest}$ ) periodically, so most heart rate monitors calculate the heart rate based on absolute intensity of exercise (%HR). To avoid any misunderstanding and inconvenience to the user, Pulsports also uses absolute intensity of exercise like other manufacturers.

The above-mentioned equation for measuring heart rate is only a rough approximation and only for adults. In some cases the people of the same age will have different maximum heart rates, the variance being about 10 to 12 bpm. People who need an especially accurate maximum heart rate are the victims of cardiopulmonary disease or those who suffer from obesity and have not exercised for an extended period of time. The safest heart rate during exercise for a man in healthy physical condition is about 90% of the maximum heart rate, but an elderly person who is obese or in poor physical condition MUST drop down to a safe heart rate zone.

## ♥ Four essences of exercise

- 1. Intensity
- 2. Duration
- 3. Frequency
- 4. Mode of Exercise

According to the purpose of exercise, we give the following brief interpretations:

### 1. Intensity of exercise:

Usually there are two ways to measure the intensity of exercise:

(c). According to **ACSM** references regarding the intensity of exercise, there are the following levels:

%	HR-Intensity
<35	Very light
<35-54	Light
<55-69	Moderate
<70-89	Hard
>90	Very hard
100	Maximal

(d). You can know your heart rate, heart rate intensity, and calories consumption per hour while exercising by the Pulsport monitor.

## 2. & 3. Duration and Frequency of exercise:

According to the purposes of exercise, here are example of duration and frequency.

### (a). Beginner:

Week	Frequency (times/week)	Duration (minutes)	Intensity
1-2	3	15-20	Moderate
1-2	3-4	20-30	Moderate

### (b). Lose weight:

Week	Frequency (times/week)	Duration (minutes)	Intensity
3-5	3-5	30-45	Light
3-5	3-5	45-60	Moderate
3-5	3-5	90-120	Moderate

### (c). Improve cardiopulmonary and physical condition:

Week	Frequency (times/week)	Duration (minutes)	Intensity
3-5	3-4	20-30	Moderate
3-5	3-5	30-45	Hard

### (d). Maintain cardiopulmonary and physical condition:

Week	Frequency (times/week)	Duration (minutes)	Intensity
---	3-5	30-45	Hard

### (e). Maintain cardiopulmonary and physical condition:

You can use Pulsports monitor to record the exercise time, efficient exercise time and exercise time within target zone.

## 4. Mode of exercise

In allusion to the different purposes of exercise, for the purpose of weight loss, we suggest considering jogging or long time walking. For improving the cardiovascular system by swimming and jogging. To ensure your safety, please ask the advice of a doctor or a coach.



## Exercise and losing weight

Balanced food intake is important while losing weight, and exercise can speed the expenditure of the calories that we take in. If you exercise 1-hour daily, but never stint yourself on food, you cannot control body weight. You can gain calories easily with a hamburger or a bottle of beer, so you cannot control your weight if the intake and consumption of calories is not balanced. The healthy intake is 15-20% protein, 20-30% fat and 50-60% carbohydrates. Moreover, sufficient vitamins and minerals are necessary. You can expend fat by dieting, but the fatty acids generated might harm your body. A man needs at least 2000~3000 Kcal daily, the value varying according to your personal requirements. We suggest you to ask a nutritionist to know how many calories you need per day, and what kind of food will be good for you.

We presume that you have controlled eating already, and we are going to present the Pulsports functions which can help you achieve the purpose of losing weight.

## **1. Energy calculations**

Calculation of calories

We can use the equation  $W = F \times S \times \eta$  to find out the calories consumed. "W" means the actual work done and "\eta" the rate of mechanical efficiency of the body, and the range is 22-25%. According to the equation we can have the following results: when W is 1000 Kcal, and the rate of mechanical efficiency of body is at about  $1000 \div 0.25 - 1000 \div 0.22$ , we are talking about a consumption of 4000 - 4500 Kcal, and deducting the actual work of 1000 Kcal, 3000 - 3500 Kcal is expended.

**Energy consumption from everyday work:**

Item	Duration	Male	Female
Sleep	8 hr	460 Kcal	350 Kcal
Eating	1 hr	90 Kcal	70 Kcal
Driving	0.5 hr	50 Kcal	35 Kcal
Standing	1 hr	125 Kcal	95 Kcal
Office work	6 hr	620 Kcal	465 Kcal
Cooking	1.5 hr	245 Kcal	180 Kcal
Showering	0.2 hr	70 Kcal	50 Kcal

- You can calculate how many Kcal you need for daily work from the above table.

## **2. Ideal body weight**

We know that there are many different equations for calculating the ideal body weight, and usually we use the ACSM equation, which uses BMI (Body Mass Index) as a reference for ideal body weight.

$$\text{BMI} = \text{Weight (kg)} \div \text{square of height (m}^2\text{)}$$

- Ideal BMI value for males is 22
- Ideal BMI value for females is 21

Normally, a range within  $\pm 10\%$  of the ideal value can be thought of as the ideal weight, so a suitable BMI for males is 19.8 - 24.2, and for females it is 18.9 - 23.1.

An easy way find your ideal body weight is:

Male: Square of Height ( $m^2$ )  $\times 22$

Female: Square of Height ( $m^2$ )  $\times 21$

For example, the ideal body weight for a male with height of 175 cm is 67 kg ( $1.75^2 \times 22$ ), and suitable weight is 60.3 - 73.7 kg ( $\pm 10\%$  of ideal body weight).

## **3. The right way to lose weight**

### **a). Heart rate and calories consumption:**

The body obtains energy from burning fuels such as carbohydrates and fat, in this process the cardiovascular system delivers oxygen to the skeletal muscles. If the skeletal muscles need a lot of oxygen it is the result of the fuels burning faster. We can train the cardiovascular system and skeletal muscles by exercise. We suggest exercising 20 minutes a day at least 3 to 5 days a week. If you desire to lose fat then exercise over 30 minutes a day is recommended. Fat expenditure depends on the time and intensity of exercise, the more you exercise the more fat will be expended. Warm up and cool down is necessary. Always do a slow warm up and cool down as well as gentle stretching for at least 5 to 10 minutes to avoid athletic injuries. 30 minutes of exercise with the addition of warm up and cool down (10 to 20 minutes) will make the average workout time around 50 minutes. If you do not have the appropriate time or cannot endure exercise for 50 to 60 minutes at one time, 30 minutes of exercise two times a day is also available. The body will keep burning fat with in 30 minutes after exercise this means more calories will be expended.

### **b). The principles of losing and retaining weight:**

#### **(b-1). Retaining weight through exercise**

Daily amount of exercise = Daily intake of calories – Basic metabolism – Daily energy consumption from work.

#### **(b-2). Losing weight through exercise.**

Daily amount of exercise > Daily intake of calories – Basic metabolism – Daily energy consumption from work.

- Surplus body fat of will expended this way.

### c). Proper principle for losing weight

Regular intense exercise can help expend extra calories; however, a plan for losing weight is better. You must have a plan that can ensure the continuation of exercise. As a reference, we suggest staying at each step for 6 months and keeping daily consumption at about 300-500 Kcal and lose 0.5 kg weekly. Do not lose more than 10% of your weight at each step, so as not to harm your body.

### 4. Control your weight using Pulsports

Pulsports has specially designed functions to help you calculate the consumption of calories and weight loss.

- K\_cal:** calculate the consumption of calories for each form of exercise.
- T\_CAL:** record the expended calorie consumption in a week or a month.
- WT\_LOS:** calculate the weight lost for each form of exercise, including water, carbohydrates and fat.
- %Fat Loss:** clearly calculate the percentage of fat lost from the total expended calories; you will realize that the fat lost varies and depends on the intensity of heart rate.
- FT\_LOS:** calculate the fat expended by each form of exercise (deducting 20% water related to fat); Pulsports will display the actual weight of fat lost.
- CAL/H:** Calories expenditure per hour. Increasing or decreasing the intensity of heart rate can control target calories consumption.

**For instance: a 25 years old female with a weight of 50 kg, exercising at the level of light intensity.**

Calories expenditure per hour: 210 Kcal ( $4.2 \times 50$ ) ~ 255 Kcal ( $5.1 \times 50$ ).

### Male

Intensity	Very light	Light	Moderate	Hard	Very hard
Age	59~65%	66~72%	73~79%	80~87%	88~94%
20~29	5.1~6.3	6.6~7.5	7.8~8.7	9.0~10.2	10.5~11.7
30~39	4.8~6.0	6.3~7.2	7.5~8.4	8.7~9.6	9.9~11.1
40~49	4.5~5.7	5.7~6.6	6.9~7.8	8.1~9.0	9.3~10.2
50~59	4.2~5.1	5.4~6.0	6.3~7.2	7.5~8.1	8.4~9.6
60+	3.9~4.5	4.8~5.4	5.7~6.6	6.9~7.5	7.8~8.7

### Female

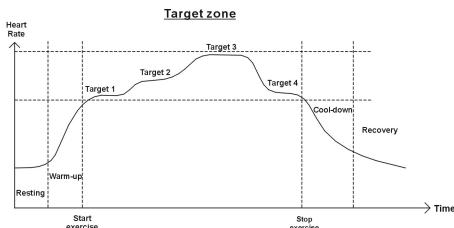
Intensity	Very light	Light	Moderate	Hard	Very hard
Age	59~65%	66~72%	73~79%	80~87%	88~94%
20~29	4.2~5.1	5.4~6.0	6.3~7.2	7.5~8.1	8.4~9.6
30~39	4.2~4.8	5.1~6.0	6.3~6.9	7.2~7.8	8.1~9.3
40~49	3.9~4.5	4.8~5.4	5.7~6.3	6.6~7.2	7.5~8.4
50~59	3.3~3.9	4.2~4.8	5.1~5.7	6.0~6.6	6.9~7.5
60+	3.0~3.6	3.9~4.5	4.8~5.4	5.7~6.3	6.3~6.9

- The above mentioned functions are available only while the heart rate is over 90 bpm.
- Above values are calculated depending on the personal data input and the heart rate.
- The calculated and recorded calories expended are from the whole process of exercise, not only just from the exercise itself.
- All functions related to the equation and generated values are based on the "body load exercise" mode; for example: walking or jogging. The heart rate will not be stable at the beginning of exercise, so the calculating of expended calories will have an error value; the value will become more accurate after warm-up.

## Special design of Pulsports – Programmable Target Zone

The reasonable/correct process of exercise could be showed by the following graph, there are three main parts:

1. **Warm-up:** for avoiding the athletic injuries we strongly recommend that you always do a slow warm up and gentle stretching for at least 5~10 minutes every time you start exercising.
2. **Target zone:** keep the preset intensity for each exercise purpose for at least 20 minutes to ensure you get results from your exercise.
3. **Cool down:** it is important as warm-up. Our body needs time to recover when moving from the exercise to the restful state. So a 5~10 minutes cool down after exercise can help you avoid athletic injuries



The correct exercise process requires at least 5~10 minutes warm up. Each target zone shift also requires 3-5 minutes to become stable. The target zone alarm will be in effect during this period, do not worry about it so much. The body is adjusting to the intensity of heart rate, so do not let the beep affect your current exercise tempo. Otherwise, your exercise graph will look like the following. You will get tired easier, and it will affect the results of your exercise.



For keeping the succession of exercise, it is not necessary to stop and reset your target zone by using Pulsports while exercising. The special functions are:

- a). **H:** Shift by hand. 1~9 target zone can be pre-set before exercise. You can shift the target zone by press the ST/SP button; it is convenient for the beginner. You can use the record of exercise graph as a reference in order to setup the next 2 function.
- b). **T:** Auto shift by pre-set exercise time for each zone. 1~9 target zone can be pre-set, too. Each zone can be set independent. The stopwatch (STW) will count down and alarm while finish by 2 beep, the sound reminds you that the next target zone is starting. Beep for 10 seconds means you have completed all the target zone of exercise. This function is suitable for the regular exerciser, because the function of count down will not be affected by heart rate and target zone.
- c). **E:** Similar to the "T" function. The count down timer is base on the exercise time, which is different from the T mode. The timer will start counting down since your heart rate must reach the low level of pre-set target zone. This function is suitable for the professional athletic.